scope of the funded services, from basic access up to inclusion of terminal equipment (computers, etc.) on a wide spread basis. Significant concerns are raised about the costs and who would fund these programs.[1] While many parties supported the idea of using proxy models to determine high cost support amounts, no parties except the sponsors of the various proxy models supported their use, because of the numerous deficiencies in the models.

Over 100 parties provided Reply Comments, with many reiterating points made in their Comments. A number of state commissions filed a Joint Reply which stated that the NPRM is very broad and lacks specificity and that a supplemental NPRM should be issued with specific proposals and definitive rules. The Joint Reply also stated the fund size should not be limited, but be adequately sized and that more time should be provided to allow development of the models presented. Also the distribution of universal service fund support should be based on a measure of costs rather than rates, since there is significant variation in rate design methods/policies among and even within states.

The Joint Board held an open meeting on June 5, 1996 to address how much support would be required for rural high cost areas, low income consumers, and how to pay for it. A panel discussion addressed Cost of Support; a second panel discussed Alternatives for Recovering Costs & Providing Universal Service Support. Also on June 5, 1996, the FCC announced the membership of its Telecommunications and Health Care Advisory Committee which will report to the Joint Board by September of 1996. Another open meeting was held on June 19, 1996 with panel discussions on Schools & Libraries and on Health Care.

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[1] Briefing binder of Jurisdictional and Universal Service Issues for the Joint Boards and Staff, NARUC Summer Meetings, Los Angeles, July 1996

On July 3, 1996 the Common Carrier Bureau, at the request of the staff of the Federal-State Joint Board, issued a Public Notice requesting cements on a list of 72 questions. These questions related 1) Definitions Issues, 2) Schools. Libraries, Health Care providers, 3) High Cost Fund, 4) Proxy Models, 5) Competitive Bidding, 6) Benchmark Cost Model (BCM), 8) Cost Proxy Model Proposed by Pacific Telesis, 9) SLC/CCLC, 10) Low-Income customers, and 11) Administration of Universal Service Support. Comments were due on August 2, 1996.

On July 10, 1996 the Common Carrier Bureau, at the request of the staff of the Federal-State Joint Board, issued a Public Notice requesting further comment on cost models. Comments were due on August 9, 1996. Summaries of the comments related to proxies are contained later in this paper.

The FCC Staff issued data request letters on August 2, 1996 to the sponsors of the different proxy models. The letter calls for replies by August 16, 1996 to be filed in the record and provided to the Joint Board. As of the writing of this paper the comments have not been filed.

CHAPTER 2

ANALYSIS OF PROXY MODELS

INTRODUCTION

The telecommunications industry has had for years engineering models. The models have been used to design the facilities needed for specific constructions projects. Proxies (models to project the anticipated cost for building a telecommunications network to provide service to a given geographic area) are theoretically possible, however the plans presented in the record to date are drastically simplified, intended for only universal service fund identification purposes and not designed for pricing, cost allocations and revenue requirement determination and even the best one of the models is seriously flawed. The regulatory staff, working with the companies, have identified a set of multi-dimensional proxies that could theoretically work. These ideas account for the many changes form the benchmark cost model 1 (BCM1) to benchmark cost model 2(BCM2). Many parties still believe that proxies, while theoretically possible, will require considerable testing. That additional testing and analysis will not be done for some time.

The analysis and comments to follow will focus primarily on BCM2 which is copy righted and some what difficult to manipulate because it has protected programing. The reason

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for this is that BCM1 has been withdrawn by its sponsors from consideration, the CPM model has

not been provided publicly (the data and perhaps the model are confidential and proprietary) for

comprehensive analysis and therefore only perfunctory review can be made. We have not devoted

much discussion to the Hatfield model because a fairly preliminary analysis of the model indicates
("Hatfield")
that its results (as shown in chart attached) deviate so greatly from actual costs that the model

can't be taken seriously at this time without detrimental effects on the current providers of

telephone services.

PROXIES

A number of parties including U.S. West, GTE, Pacific Tel, MCI, AT&T and others

advocated the use of some kind of a proxy method, at least as a transitional approach, to

determine the level of high cost funds that should be allocated to any given geographical area.

GTE recommended that the proxy method should ultimately be replaced by a bidding mechanism.

Numerous other parties recommended rejection of the use of proxies alleging that no system of

proxies could accurately predict high cost.

The primary reasons proxy methods are desirable include the fact that they are less

susceptible to manipulation than "book cost" based funds, the fact that they are more compatible

with a competitive environment, because they can be used to better target customers in some

study area units that are actually high cost and the fact that they are more related to the cost of

providing service in the future because they are not tied to past (embedded) costs.

The first proxy method proposed by U.S. West was based primarily on density per

square mile and distance of the subscribers from the wire center as indicators of high cost. U.S.

West used its proxy method to determine the cost for each census block. It then proposed to use those costs to determine eligibility for High Cost Funds on a census block by census block basis. U.S. West tested the accuracy of its proxy approach by comparing the cost developed using the proxy to the costs derived using a model developed by RAND. There were problems with both the substance of the U.S. West model and the manner by which it is tested by U.S. West. US West agreed that there were problems and major modifications were required and resulted in BCM1 model being developed.

The primary deficiency with the first U.S. West model was that several factors other than density and the distance customers are from the wire center, appear to contribute more to any given area having high cost. An examination of data provided by some companies using the U. S. West model for locations in the midwest shows that the first U. S. West model which was solely based on density and distance from wirecenter had little Correlation to high cost. An examination of study areas having similar book costs but different densities further demonstrates this fact. Initial examination by many parties revealed that other characteristics may be closely related to costs. One factor that appeared to have a great effect on cost is the topography of the area being served. Some other factors that were identified as being related to causing high cost include the size of serving wire center, road accessibility, climate, whether the area is served by an Rural Utility Services borrower, the area's distance from a fairly large population center, and vintage of facilities.

The U.S. West test for accuracy of its first proxy method was problematical because its proxy based costs were not compared to "real" or "embedded" costs but were compared to other proxy derived costs. Because the RAND costs development model contained the same primarily

dependant variable as the U.S. West proxy (density) it was not surprising that the proxy appeared to correlate with the "costs" that are developed using the Rand model. Many parties reviewing the first study advanced the position that In order to determine whether a proxy factor is usable it must be compared to book costs or other "real costs" developed using some primary dependant variable other than the one underling the proxy itself.

The GTE proposed a model that used proxies for sub-study area units as a transitional high cost fund allocation method. Its method proposed to "correct" for deficiencies in the proxy method by using a factor to "true up" the sum of the proxy derived cost for all the census blocks in a study area to the book costs for each study area. That frozen factor would then be used in the future to adjust the proxy derived costs for any sub-study area unit.

The deficiency with this method is the fact that the average ratio between the sum of the proxy derived census block costs and the book costs for the entire study area will not likely represent the ratio of any given individual census blocks to its book cost unless all the census blocks in the study area are homogeneous. The more homogeneous a study area is, the more truing up using the GTE method, will either overstate or understate the cost for any given census block.

General Comments on the Application of Models

The models estimate cost on a total service unseparated basis. The models are proposed by most parties for the purpose of determining what portion of universal service support fund should be supported through the Federal plan. The models assign all loop costs on a unseparated basis to dialtone lines for the purpose of choosing an appropriate level of the Federal affordability

benchmark. While this may be appropriate for the purpose of determining the need for Federal universal service funds, this same methodology should not be used for the purpose of setting either Federal or State rates for any services including local exchange service, even if the models were perfect. The models allocation of all loop costs to local exchange services may also be contrary to admonition in section 254(k) of the Act which does not permit the assignment of all joint costs to services receiving universal service cost support.

The proxy models do not capture unique characteristics such as: glaciers, permafrost and ice effects; the lack of road system; limitations placed on surface transportation and construction due to Arctic conditions; and high labor costs. If a proxy model is used, then select a model that is sound from engineering and economic perspectives. In this regard, both the BCM2 and CPM models are superior to the original BCM model or the Hatfield model. BCM2 model and the CPM model might be merged into a single model that may have results that more closely replicate actual engineering and as built costs.

The use of actual wire centers or sub wire centers areas reflecting actual serving topologies is preferable to CBGs. The proxy methodology should study a geographic area which matches the actual network design for which costs are incurred. Since the standard upon which the proxy models are being judged is their ability to replicate actual costs, simply use actual book costs may still be preferable and should always be used as a test by which to evaluate model reasonableness. Universal service support should be based on book costs until such time as a workable model can be developed.

Rural companies should be allowed to obtain universal service support based on actual book costs instead of proxy costs for the time being, because errors in the existing models could

endanger the continued existence of universal service in rural areas and could irreparably impact

the public health and welfare of persons residing in those areas. Further more the Act requirement

of comparable service at comparable rates could be seriously undermined if unproven proxies are

employed for small companies in rural areas. Rural companies should transition off of book costs

if and only if it can be demonstrated that the models reflect the cost of small companies and if

there are streamlined waiver procedures to use alternative methods.

Until the various inputs to the models can be demonstrated to have a direct correlation to

cost causality and its magnitude, proxy models are not appropriate for determining prices. All the

models are replete with unproven assumptions and factors where the relation of those factors to

cost have not been demonstrated.

There is a concern with the fact that all the models construct an optimal network which

is unrealistic and impossible to create in the real world. For example all the models assume that

all portions of the network will be built simultaneously and will not necessarily meet actual service

demands. Further more all the models make no provision for less than optimal externalities which

are experienced by all operating telephone companies. Failure to recognize these real externalities

and network design constraints will seriously under estimate cost and possibly make it impossible

for companies to be able render affordable reliable telephone service.

The various proxy cost models that have been submitted are generally quite complex,

having variable inputs, tables, and calculations, and neither sufficient time nor sufficient

information about the models has been provided to perform a detailed review of any of them. The

wide disparities in the models' cost outputs support parties position that universal service support

calculations should be based on an eligible carrier's actual costs for the time being until better

models can be developed. Further more if making a workable proxy turns out to be more complex than reviewing or designing facilities and pricing them out, then the effort to do this should be reconsidered.

Proxies should be judged on the following criteria:

(a) easy to administer and simple to implement

(b) reasonably reflect actual costs in order to ensure that support is "sufficient"

(c) appropriately relate costs and support levels

(d) reflect cost differences that actually exist geographically by LEC

(e) compliance with the substantive requirements of the 1996 Communications Act

Proxy cost models should satisfy the following criteria:

1. Model should be publicly available and easy to understand and operate.

2. Inputs and outputs should be reasonable.

3. The network designed by the model should be capable of evolving into a network which in th efuture can provide high quality voice, data and video service to the extent as required by the 1996 Act.

4. The model should accurately reflect the elements which it purports to reflect.

5. The model and its application to the targeting of high-cost support to specific geographic areas should assure the continued provision of affordable basic telephone service and encourage the efficient evolution of local competition.

Bench Mark Cost Model

The flaws in the BCM include:

(a) the assumption that all households are evenly distributed throughout the census block group in which they are contained was partially remedied by shrinking the census block

group squared size but is still a problem because it still does not reflect the actual plant construction to meet demands for customers who's locations are usually somewhat clustered around certain serving areas ;

(b) uses census block groups which in many cases do not represent the way geographical areas are served. LEC networks are constructed and, hence costs incurred, on a wire center or serving area basis;

(c) many census block groups are assigned to the wrong wire center or to a wire center physically not capable of rendering service (ie. Across a high mountain or on the wrong side of a body of water).

(d) In the BCM, algebra is used to develop loop lengths and cable size, these inputs are not explained or verifiable at this time.

(e) BCM2 vastly underestimates the impact of loop length caused by slope. The magnitude of the slope multiplier is not large enough, it should large enough to convert the point to point distance calculated in the model to route miles of plant.

(f) The models proponents need to provide more documentation about their models, including data sources and specific algorithms for arriving at each of the user-defined input values.

(g) The switching costs used in BCM2 are not appropriate for rural areas where customers must be served by very small switches or remote. Recommend that per line switching costs be modeled for switches having less than 100 lines, 100 to 500 lines, 500 to 1000 lines, 1000 to 5000 lines and 5000 to 10000 lines.

(h) The higher costs of operation and maintenance in remote areas are not reflected in

BCM2.

(i) Use of a road system to determine where households are assumes that if there are no roads the are no people. That is incorrect.

(j) BCM2 caps loop costs at $10,000, assuming that wireless would be used for areas with costs above that. However, it may be impossible to serve those people with wireless service due to technical, environmental or logistical problems, including the lack of electricity.

(k) BCM2 also assumes the same traffic factors exist nationwide, even though the nature of traffic is significantly different between serving areas around the country.

(l) BCM2 does not attempt to model specific interoffice network costs.

(m) BCM2 plant specific annual cost factors are lower than the ARMIS factors in BCM. There is no documentation for these lower factors.

(n) BCM2 includes remote switches, which is an improvement over BCM, however, BCM2 merely places remote according to current practices rather than determining where a remote should replace a small stand alone unit.

(o) The model assumes square CBGs which under estimates the loop costs to the extent the CBGs are not square.

Despite the fact that BCM2 needs to be modified and justified substantially to make it usable for even high cost fund determination purposes, it is, in our opinion, the only model that has any hope of being useful. *(including Hatfield)* The other models are so seriously flawed that we do not believe any amount of work or modification can remedy their serious deficiencies.

California Pricing Model (CPM)

Parties claim that CPM is little more than a spreadsheet on which are collected input values based on proprietary data, undocumented judgements or assumptions and the outputs of other models. CPM reflects embedded rather than forward-looking costs. CPM's inconsistent use of terrain modifying factors artificially inflates loop investment costs. CPM bases central office switch and feeder costs solely on average population density of the grid, ignoring the number of lines serviced by the switch, and employs unrealistically short depreciation lives.

Parties comments state that the switching costs in the CPM do not fully capture the defference in unit costs between large and small switches and the level of costs used by Pacific are not representative of those experienced by other companies because of unique contracts Pacific has negotiated with its switch suppliers. This is a common complaint about all the models.

CPM has drawbacks which limit its application on a national basis. On of the most obvious drawbacks is the fact that CPM employs proprietary data on the location of all residential and business customers

Hatfield Model

One major concern of the BCM 1 is the use of multiplicative factors to drive most of its costs as a function of materials costs, the incorrect specification of structure costs as a function of cable size, and the distribution plan algorithm. The model places 400 pair cable in places that are actually likely to be served by 25 pair cable. While many concerns have been addressed in BCM 2, these concerns are worth noting because they are still contained in the Hatfield Model, which is based on the BCM1.

This model suffers from numerous deficiencies:

(a) It would appear that the revisions to the Hatfield model are result driven and the model can be adjusted to produce whatever cost answer its sponsors desire.

(b) Fill factors are too high, costs of capital are too low and depreciation rates that are too slow.

(c) The model does not seem to have been run through the set of theoretical and empirical tests that are routinely used to ferret out modeling errors.

(d) The model like BCM1 from which it was derived contains a anomaly; doubling the price of cable results in a near doubling of the cost of installation. Thus, under estimates for material needs or costs are amplified by the model.

(e) The model does provide estimates sufficiently accurate for use by small companies because of the wide variation from actual experienced material costs.

(f) The model seems to use unrealistic switch prices and installation costs.

(g) The model employs unrealistically low cable facilities costs.

(h) Hatfield omitted certain costs such as engineering and cable splicing costs.

(i) Hatfield does not model the current methods of deploying distribution plant.

(j) The Hatfield model uses copper for very long loops but does not provide for conditioning, amplification, or loading costs.

(k) The model uses a mathematical construct to determine customer locations without demonstrating that the resulting locations in any way match reality.

Most importantly the results of Hatfield do not even pass a "straight face test".

Although we would never expect the results of any proxy to match net book costs, the results of

the Hatfield model do not even come close to correlating to the order of magnitudes of net book costs. As can be seen from the comparison of the models revenue requirement per month with actual revenue requirement data: the ratio between the highest of $26.46 for Mississippi and the lowest California which is $13.49 is less than two to one. While the ratio of the highest from the actual loop costs from the monitoring report which $32.83 for Wyoming to the lowest of the District Of Colombia which is $6.42 which is over five to one. Further more, the lowest and highest cost jurisdiction under the Hatfield model, which are California and Mississippi respectively, are far from the lowest and highest cost jurisdiction based on actual loop cost data that is available publicly.

APPENDIX B

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                    ORAL DEPOSITION

                          OF

                 DR. ROBERT A. MERCER

                - - - - - - - - -

     ANSWERS AND DEPOSITION OF DR. ROBERT A.

MERCER, produced as a witness in the above-styled

and numbered cause on the 24th day of October,

1996, before Frances M. Slocha, a Certified

Shorthand Reporter in and for the State of Texas,

at the offices of Cohan, Simpson, Cowlishaw &

Wulff, 350 N. St. Paul Street, Suite 2700, in the

City of Dallas, County of Dallas, State of Texas.

APPEARANCES

     MR. IVAN T. WITCHER
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     Austin, Texas 78759-7200

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               COUNSEL FOR GTE

     MS. PATRICIA ANN GARCIA ACEVEDO
     MCI Telecommunications Corporation
     701 Brazos, Suite 600
     Austin, Texas 78701-3300

               COUNSEL FOR MCI

     ALSO PRESENT: MR. BOB CLAPMAN
                    MS. VALERIE WARM-PHLAN

          DR. ROBERT A. MERCER,
the witness hereinbefore named, being first duly
cautioned and sworn to testify the truth, the whole
truth and nothing but the truth, testified under
oath as follows:

          EXAMINATION
BY MR. FUHR:
     Q. Dr. Mercer, would you state your name
for the record?
     A. Yes. It's Robert A. Mercer.
     Q. What is your business address?
     A. It's Hatfield & Associates, Inc., 737
29th Street, Boulder, Colorado, 80303.
     Q. What is your position with Hatfield &
Associates?
     A. I'm the president of the firm.
     Q. How long have you been involved with
that firm?
     A. Since 1987.
     Q. Did you found that firm?
     A. No, I did not.
     Q. Do you know when that firm came into
being?
     A. Yes, approximately 1982.

1 John Donovan?
2   A. Oh, I would say in total, probably
3 equivalent to my discussions with AT&T and MCI,
4 maybe a little bit less. Let's say perhaps
5 fifteen to twenty times have I talked directly
6 with Mr. Donovan.
7   Q. And how about for Mr. Chandler and
8 Dr. Kelley?
9   A. Mr. Chandler, quite frequently. I
10 would -- I would assume many tens of times.
11 Mr. Kelley, relative -- Dr. Kelley, relatively
12 seldom, since Dr. Kelley dealt with economic
13 matters, and Mr. Donovan was the technical expert.
14   Q. With respect to those communications
15 that you, Mr. Chandler and Dr. Kelley had with
16 personnel at AT&T, MCI or Mr. Donovan, to your
17 knowledge, are there any notes or records of any
18 of those communications?
19   A. There were not -- if there were any,
20 there were not very many for the reason that our
21 typical way of doing business was to -- either by
22 telephone or in person to meet with Mr. Donovan to
23 discuss inputs with him to have him typically go
24 off and do research, and then we entered the
25 results directly into the model; so the model

1 becomes essentially a living document of the --
2 you know, of the conversations we had. I believe
3 there was produced in the Southwestern Bell case
4 here, I believe that Mr. Donovan did have one
5 relatively brief set of work papers that he
6 submitted.
7   Q. Do you, Mr. Chandler or Dr. Kelley have
8 any work papers or notes relating to any of those
9 communications?
10   A. Not to my knowledge. I certainly
11 personally don't have any. And, again, I believe
12 that Mr. Chandler and Mr. Kelley's normal mode was
13 after these discussions to directly reflect the
14 discussions in the model itself.
15   Q. Was there or is there a company policy
16 not to maintain any notes or records of those
17 communications?
18   A. No. We -- we just -- it's just that we
19 felt that the model itself was the place to
20 capture what we were doing. Obviously we've been
21 working pretty diligently and for quite a long
22 time at this, and we said that that would be our --
23 the way to capture it was to reflect it in the
24 model itself. We have no policy against keeping
25 notes.

1   Q. To your knowledge, has there ever been
2 any discussion among you, Chandler, Kelley or
3 Nugent with respect to whether notes should or
4 should not be kept with respect to any of those
5 communications?
6   A. No.
7   Q. And can you recall or are you aware of
8 any such communications on that subject with AT&T
9 or MCI?
10   A. Not that I was involved in, and I think
11 I would have been involved in them since -- you
12 know, as president. I mean, if there were a
13 discussion like that between Kelley, for instance,
14 I might not know of it, but there is certainly no --
15 you know, it has not been a major policy
16 discussion of the company.
17   Q. Has it been a minor policy discussion?
18   A. I don't believe so. Not in my own
19 case.
20   Q. Are you aware of any discussion on that
21 subject?
22   A. No, I'm not.
23   Q. And you believe if there had been such
24 discussions, at least with respect to Chandler,
25 Kelley or Nugent, that you would be aware of that

1 discussion?
2   A. Well, that was my point of why -- the
3 only reason I didn't make an unequivocal statement
4 is obviously I would not be aware of every
5 conversation that took place in the office, but
6 inasmuch as it's a matter of setting company
7 policy or discussing matters like that with a
8 client, I would generally be aware of such
9 discussions, and there was no such discussion.
10   Q. The Hatfield model has undergone a
11 considerable number of changes and revisions since
12 it was first issued, would you agree?
13   A. It has come out in two or three
14 releases basically, and each release has
15 reflected, yeah, a fairly substantial number of
16 changes.
17   Q. And the release that is now the model
18 that you are advocating in this proceeding is
19 Version 2.2, Release 2; is that correct?
20   A. Yes, that's correct.
21   Q. There has been discussion, has there
22 not, of developing a Release 3 or a subsequent
23 release; is that correct?
24   A. There has been some discussion. There
25 is no firm decision to do that.

1   Q. Would you identify who the participants
2 to those discussions have been?
3   A. It would be the same set of people.
4   Q. You, Chandler, Kelley and, to a lesser
5 extent, Mr. Nugent?
6   A. Yes, and the -- and the clients as
7 well. And Mr. Nugent, I believe it's fair to say,
8 has not been involved in those discussions, but
9 the three of us at Hatfield & Associates and the
10 clients as well have discussed whether there is
11 further evolution required.
12   Q. And the people at the client that
13 you're referring to are Michael Lieberman and Mark
14 Bryant; is that correct?
15   A. Yes. And Mr. Lesher and --
16   Q. Is he with AT&T?
17   A. Yes, he is. And in the case of MCI, I
18 would also add that those discussions of the
19 overall work program in that kind of discussion
20 would also include Mr. Pelcovits,
21 P-E-L-C-O-V-I-T-S, first name Michael.
22   Q. Has there been any meetings in which
23 these discussions took place?
24   A. There have been telephone calls. I'm
25 not sure there have been any face-to-face

1 meetings. There have been telephone calls.
2   Q. When did those telephone calls first
3 begin?
4   A. Well, they would have -- I mean
5 literally start probably even before the issuance
6 of Release 2 as to whether we had everything in
7 Release 2 that we wanted to, and we believed we
8 did. The discussions have probably gone on since
9 that time.
10   Q. When was the most recent discussion?
11   A. My own involvement, probably three
12 weeks ago. I've been on the road quite a bit, so
13 I may not have been involved in the most recent
14 discussions. In fact, I have not been involved in
15 more recent discussions.
16   Q. To your knowledge, has there been more
17 recent discussions?
18   A. I believe there have, yes, involving
19 Mr. Chandler and some of the other members of the
20 client firms.
21   Q. And has Mr. Chandler described to you
22 the nature of those communications?
23   A. Not in any great detail, no, because
24 he's right now with the clients -- the discussions
25 have to do with are there things that are not done

1 fully in the Hatfield model and so what to do
2 about those things.
3   Q. Has Dr. Kelley been party to those
4 communications as well?
5   A. I'm not sure.
6   Q. When did you last get advised by
7 Mr. Chandler of those communications?
8   A. I would say roughly in the last -- you
9 know, on the order of two weeks ago perhaps.
10   Q. Would that have been before or after
11 your testimony in the California proceedings?
12   A. It would have been in the same time
13 frame, because I testified -- well, I've testified
14 now -- there's been one false start and four
15 actual testimonies, and since they were more than
16 three days ago, I couldn't tell you when they
17 happened, but they would have been in the same
18 time frame.
19   Q. Would you describe your recollection of
20 that communication with Mr. Chandler?
21   A. It was to the effect that he had had
22 discussions with AT&T primarily pertaining to the --
23 the issue of the use that we make right now of a
24 model called the BCM-plus and whether that was the --
25 the best way to continue to go forward linking the

1 model to BCM. BCM stands for benchmark cost
2 model.
3   Q. Release 2.2 obtains some of its inputs
4 and relies on BCM-plus; correct?
5   A. Let's be more specific. Version 2.2,
6 Release 2. The 2.2.2 --
7   Q. Right.
8   A. -- uses a version of BCM that we refer
9 to as BCM-plus, yes. That's all spelled out,
10 B-C-M dash P-L-U-S.
11   Q. BCM-plus is a model that you had
12 involvement in developing; is that correct?
13   A. Yes. It really represents the
14 embodiment of every improvement that we made to
15 the benchmark cost model itself. At some point we
16 said it was -- we believed it was appropriate to
17 identify that set of changes as a -- you know,
18 separately identify that in some fashion, and
19 that's when we, really under the direction and
20 request of MCI, adopted the name BCM-plus to
21 describe the current version of BCM that we're
22 using.
23   Q. Are there discussions underway to
24 disassociate the Hatfield model from BCM-plus?
25   A. In name perhaps, and we are looking at

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1 the techniques of BCM to -- to see if we're still
2 closely akin enough to use the name. The
3 discussions have been mostly about the use of the
4 name or whether we have departed enough from BCM's
5 mechanisms at this point that it's confusing to
6 continue to use the name BCM.
7   Q. Other than word submitting and changing
8 reliance on something called BCM-plus, is there
9 any other effort to change the reliance on the
10 substance of what BCM-plus represents?
11   A. Not on what BCM-plus represents.
12 BCM-plus already represents a rather substantial
13 departure from BCM, and -- you know, so if there
14 were -- if there were further refinements to the
15 model and if they dealt with the outside plant,
16 then we might say, well, we're even further
17 removed from BCM, so they would not be very -- at
18 least to my knowledge now, our thinking is that if
19 there were additional refinements, those
20 refinements would be relatively small to BCM-plus,
21 but that BCM-plus already differs pretty
22 substantially from BCM.
23   Q. Is it fair to say that there is an
24 analysis underway with respect to what further
25 changes can be made to BCM-plus so it is even less

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1 related to BCM-2?
2   A. The discussions don't have to do with
3 whether it should be less or more related as much
4 as are there things that should just be done to
5 the model.
6   Q. And what are the things that you are
7 referring to?
8   A. Well, certainly first and foremost we
9 have considered the use of a finer grained
10 population database. The census bureau publishes
11 results that come in various levels of
12 granularity. We use census block groups in our
13 model. There are census blocks which are a finer
14 grain division, and we considered the use of those
15 to -- at least in principal considered the use of
16 those asking ourselves if it's worth the
17 additional complexity of doing that, because it is
18 quite a bit more complex.
19   Q. What are the advantages of making that
20 type of change?
21   A. You have a finer grained population
22 distribution that way.
23   Q. And what is the advantage of that?
24   A. Only that you may further relate the
25 model to the real demographics of the area being

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1 studied as opposed to using a wider, you know,
2 larger area.
3   Q. Is this data publicly available?
4   A. Yes, it is.
5   Q. And from whom would you get this data?
6   A. It's published by the census bureau.
7   Q. If that data were implemented in this
8 model, would that affect or change any of the
9 costs that this model generates as outputs?
10   A. We don't know for sure. Our general
11 belief is that the more you represent -- or
12 recognize, I think, is the word I mean -- the more
13 you recognize population variations, generally the
14 results will lead to a somewhat lower cost for the
15 reason that if you have concentrations of
16 population, you generally have a more efficient
17 network to serve those concentrations, and so you
18 might anticipate that doing the results that way
19 will lead to lower cost results, but that's a
20 speculation. We're not sure that's the case.
21   Q. Has Hatfield & Associates acquired this
22 new data?
23   A. No, it has not.
24   MR. FUHR: Actually let's go off
25 the record for a second.

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1   (Discussion off the record.)
2   (Recess.)
3   Q. Dr. Mercer, returning to some of the
4 changes or modifications that are being
5 contemplated with respect to BCM-plus, what other
6 changes are you aware are under discussion other
7 than the change with respect to the type of CBG
8 data that is relied on?
9   A. There are some minor changes. I'm
10 trying to recall examples. There is one that I
11 know of because I helped discover it. There was a --
12 a minor bug in the model that if in some
13 particular feeder run you require more than a
14 forty-two hundred pair cable, which is the maximum
15 size we assume -- the model right now does not put
16 in an additional conduit, plastic PVC conduit for
17 that -- for that larger cable -- the effects are
18 obviously extremely small, because you're talking
19 about a very, very large cable situation and a
20 very small conduit cost, but that was something we
21 discovered.
22   Q. How did you discover that?
23   A. How did we discover that? I believe
24 that -- I'm not -- I'm not sure that I recall. I
25 believe that I asked Mr. Chandler at one point how

1 the conduit cost was calculated and he was showing
2 me on the screen and we discovered as we looked at
3 it that it did not have the check that said if
4 it's greater than forty-two hundred cables put in
5 a second conduit.
6   Q. What other changes?
7   A. The rest that I know of -- again, I'm
8 not privy to all of the detailed calculations.
9 Mr. Chandler may have had fall in the area of
10 input prices and whether we have all of those
11 correct. As I understand, there's some -- some
12 feeling that some of the cable costs might be
13 overly high, and so I think we are generally doing
14 a review of the inputs again to see if there are
15 further refinements necessary. In going from
16 Release 1 to Release 2, we considerably increased
17 the cost of cable and outside plant structure, and
18 we're reviewing those just to make sure that we
19 made no -- no mistakes on that.
20   Q. Are you aware of any other specific
21 inputs in which the value is being reanalyzed,
22 other than cable prices?
23   A. Well, cable and structure I said. We
24 know we have an anomaly where, for instance, our
25 manhole cost for the interoffice part of the

1 judgment, BCM-plus did not treat properly, and
2 they were instead treated by Release 2 rather than
3 just simply obtaining them from BCM-plus; is that
4 correct?
5   A. Not BCM-plus. We need to clarify.
6 BCM, which is the external model we used, did not
7 do certain things right and did not do some things
8 at all. The manhole cost, for instance, was not
9 in BCM, so we -- we had to add that value. And
10 the cable cost generally we changed. So with that
11 correction, that's right. We're talking about
12 changes we made going from our Release 1 to our
13 Release 2 and looking at what BCM externally had
14 done and saying there were some things that we
15 believed were incorrect.
16   Q. What other changes to BCM-plus are
17 being contemplated?
18   A. I don't believe offhand that there are
19 any other changes being contemplated. We do need
20 to document better the assumption we have made in
21 rural areas where we assume fewer distribution
22 cables than we do in other areas and -- or I
23 shouldn't say fewer cables, but a lesser
24 distribution length. And we are cleaning up the
25 documentation of that. I think generally the

1 network is higher than for the feeder part of the
2 network. In reconstructing why, we don't have any
3 sound rationale for the higher number since we
4 believe the feeder calculation is correct. So
5 we're looking -- that's an example of how we're
6 looking at numbers and saying are the -- where
7 along the way when we entered those numbers did we
8 make a mistake, or did we believe that an
9 interoffice manhole might be more expensive and so
10 on. It's that kind of thing. It's -- other than
11 just looking at the census block group, it's
12 looking at that kind of change.
13   Q. These last two changes that you've
14 discussed which relate to input prices, are those
15 inputs or values that the Hatfield model obtains
16 from BCM-plus?
17   A. No. BCM-plus did not do cable cost or
18 structure cost correctly, it turns out. We were
19 unaware of that for awhile, but --
20   Q. And that is a change or a modification
21 that is incorporated in Release 2 or Version
22 2.2.2; correct?
23   A. I'm sorry, what are?
24   Q. I believe you just indicated that cable
25 and manhole costs were items that, in your

1 documentation needs to also reflect any changes
2 we've made and reflect perhaps better in a few
3 cases what we've done.
4   Q. Are you aware of any other changes or
5 modifications to BCM-plus that are being
6 contemplated at this time?
7   A. I'm not aware of any. Again, there may
8 be in the last few weeks some discussions I'm not
9 familiar with, but certainly the last time I had
10 discussions, those were the kinds of changes we
11 were looking at. And, I mean, more specifically
12 those were the changes. I just -- I hesitated
13 before. I don't recall anything else that we're
14 considering doing at this point to BCM-plus.
15   Q. And is Mr. Chandler also the person who
16 is most familiar with what is being contemplated
17 in terms of changes to BCM-plus?
18   A. Yes. And the reason for this -- I
19 mean, at one point I was working, obviously quite
20 closely, with Mr. Chandler and the clients. As I
21 have become the road warrior, I have been
22 traveling by necessity. Mr. Chandler has picked
23 up more of the burden of any changes that might be
24 contemplated to the model while I've been out on
25 the road testifying.

A. No. I wouldn't -- we did not change
the equations. What we did is we understood what
BCM did well enough to know what calculations were
done. And to the extent those calculations were
done incorrectly, we did either upstream or
downstream processing to bring the additional
factors in that we felt were -- were necessary.
   Q. Have you submitted documentation that
lays out each of these four to five thousand
formulas and describes why they're structured the
way they are structured?
   A. No. As I say, the model document -- I
mean, the model itself is available to people and
can be examined, but we have not systematically
written each equation down separately from that
and described it.
   Q. Wouldn't you agree that providing that
type of description or documentation for the
equations would facilitate a user's ability to
understand and examine the model considerably?
   A. It might help them, yes. I don't think
that's -- that's necessary nor that that's a
requirement of a public model. It might help, and
it might be something that could be done someday,
but --

some of those equations are pretty straightforward
equations that would presumably require very
little explanation. The rest you would just -- I
don't know any way to do it except to
systematically go through and -- and describe each
equation.
   Q. Were you the primary architect or
creator of these equations?
   A. No.
   Q. Who was that?
   A. It was myself in conjunction with
Mr. Chandler, but, as I mentioned before,
Mr. Chandler primarily wrote the spreadsheets and
the equations themselves.
   Q. So then would you not be the main
creator of the equations themselves?
   A. No. I'm saying that he created many of
the equations, and he created all of them in the
software sense of writing them down. I never
created the spreadsheets for the model. So he did
a hundred percent of the writing of the equations
in the electronic sense, and, you know, he and I
shared the task of defining what the equation
should be.
   Q. Are there any work papers that document

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   Q. Do you know of any reason why that
could not be done?
   A. Do I know of any reason it could not be
done?
   Q. Correct.
   A. I know of no reason why it could not be
done. Again, I mean, our attitude was that people
were going to have this model, be able to examine
it and make either positive or negative statements
about it accordingly. So we did what we could,
you know, in the time frame we had to do and what
we thought was most important and assumed the
users would -- could take from there if they felt
necessary.
   Q. Are you aware that users have been
requesting documentation on these equations for
some time?
   A. No. Actually I'm not aware of
receiving such a request.
   Q. What would be involved in producing
that type of documentation?
   A. Well, you would -- I would assume you
would have to go through equation by equation,
which if I accept my colleague's statement as five
thousand equations, and write them down. Now,

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that process you went through in designing those
equations?
   A. No. There's, of course, the model
itself, which is like a living work paper, but
there's nothing else that describes how we did it.
   Q. What happened to the papers on which
presumably you went through various drafts in
creating those equations?
   A. First of all, I'm not aware of any time
we actually wrote those down on paper. I believe
the more common process was after discussion of
the equation, Mr. Chandler entered them into the
model. If he did take notes, I -- as I say, I
don't remember any time ever seeing an equation
like that written down. If he did or if he took
notes like that after he had put them into the
model, I assume that he discarded those notes as
no longer relevant.
   Q. Is there any other category of
information or inputs in this model that the user
cannot change, other than those you've just
identified?
   A. Well, let me -- let me review what we
said just to make sure we've got the same list.
The equations themselves cannot be changed.

1 Certain numeric values in those equations are part
2 of that general comment that they can't be
3 changed. We've identified certain inputs that
4 have to do with the input demographics and terrain
5 that cannot be changed.
6 Q. I believe you also said the location of
7 the wire centers.
8 A. Yes, could not be changed, and the
9 distances between those wire centers. Again,
10 subject to further thought, I'm not aware of
11 anything else, any certainly categories of things
12 that the user is not able to enter.
13 Q. Would you give me some examples of
14 numeric values that are in your equations that
15 cannot be changed?
16 A. Yes. We have done a -- as we describe
17 in the documentation, we assume that the
18 distribution cable has a length equivalent to
19 five-eighths of the side of the CBG, and the
20 five-eighths in the equation when you're
21 calculating -- after calculating what the side of
22 the CBG is, when you're doing the distribution
23 cable length, there is a formula that will have
24 the .625 in it. And you cannot change the .625.
25 That's a -- that's a for instance.

1 would depend on each -- each piece of the model
2 is -- is contained within modules, and each module
3 description that's in the documentation would
4 describe how that particular module works. I
5 would again point out that numbers like the .625,
6 if they're not in the documentation, are in the
7 model, and you can see rather straightforward how
8 that calculation is done.
9 Q. Okay.
10 MR. WITCHER: Ed, what -- just
11 briefly, what is your thought on the other two
12 depositions we've got going on?
13 MR. FUHR: Just one after the
14 other.
15 MR. WITCHER: Okay. Again, you
16 know, the last one has to be over by 5:30.
17 MR. FUHR: Right.
18 MR. WITCHER: As long as you're
19 comfortable with that.
20 MR. FUHR: I mean, I'd prefer they
21 could go later.
22 MR. WITCHER: Yeah, but I
23 accommodated yesterday in quitting before I was
24 through on Duncan's.
25 MR. FUHR: This can be off the

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1 Similarly -- well, I'm not sure how
2 many -- but it's that kind of thing, in other
3 words, where the assumptions of the model have
4 been embodied as a numeric calculation.
5 Q. And to take that example, is there
6 anything the user can do to change that assumption
7 that goes into the model?
8 A. No. That would be an example of a --
9 of a part of what makes this the Hatfield model
10 that is not accessible to the user.
11 Q. And is there anywhere an itemization of
12 those assumptions?
13 A. Quite a few of those appear as -- in
14 the documentation, the Version 2.2, Release 2
15 documentation that accompanies the model. I'm not
16 sure that -- that you would say that that's
17 exhaustive of every parameter, but quite a bit of
18 the way we did the calculations are described in
19 the documentation itself.
20 Q. Can you point to anywhere in your
21 documentation where those assumptions that carry
22 with it a quantification that ends up carrying
23 through the rest of the model is located?
24 A. No. It would be in various places in
25 the documentation. I mean, in other words, it

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1 record.
2 MR. WITCHER: Yeah, this can be
3 off.
4 (Discussion off the record.)
5 Q. Is another example of one of the
6 assumptions of the model that cannot be changed by
7 the user is the fiber copper cutoff?
8 A. No. That's actually a user input.
9 Q. And is it your understanding that that
10 input can be changed by the user?
11 A. Yes.
12 Q. What about cable multipliers?
13 A. What do you mean by cable multipliers?
14 Q. There are assumptions made in the model
15 with respect to cable multipliers, is there not?
16 A. Again, I'm not sure what you mean.
17 Q. Do you have a -- was it one of the
18 modules in the Hatfield model that has a cable
19 multiplier in that?
20 A. Well, there would be multipliers, you
21 know, like five hundred -- fifty-two eighty feet
22 in a mile. You may be referring to in Release 1.
23 To calculate the structure costs, we had structure
24 cost as a fraction or multiplier of the cable
25 cost, but that's no longer the case.

1 assumption?
2   A. I'm not sure by individual category,
3 but, again, the overall network operations
4 reduction that we mentioned that has been
5 achieved, the Hatfield model is bound by the way
6 expenses are reported to ARMIS. If those
7 categories were separately broken out, we could
8 have examined each one separately, but that's a
9 composite category as reported by -- into ARMIS,
10 and we believe overall that is an achievable
11 reduction.
12   Q. By overall, you're talking about at
13 thirty percent overall with respect to the five or
14 six categories I just identified?
15   A. Yes, that's correct.
16   Q. What study have you done to determine
17 whether you can obtain greater than a thirty
18 percent reduction in any of those categories?
19   A. We haven't looked at any individual
20 category. To our knowledge, those items are not
21 reported separately anywhere that we're aware of.
22   Q. So if the percentage for power expenses
23 could not be reduced by thirty percent, the model
24 necessarily assumes that other categories will be
25 reduced by greater than thirty percent; correct?

1   A. Yes. Again, it was based on a
2 composite result that said that there overall was
3 a considerable reduction that you could see in a
4 certain -- in a certain company, so that -- but
5 that would follow that if you have a conglomerate
6 or composite of six categories and some you could
7 not achieve that kind of reduction, then others
8 you must be able to.
9   Q. The model makes certain assumptions
10 with respect to trenching, for example, that
11 structure costs will be shared by GTE and other
12 utilities; is that correct?
13   A. That's correct.
14   Q. What investigation has been done in the
15 State of Texas to determine whether there is
16 likely to be any such sharing of expenses by GTE
17 with other utilities?
18   A. Again, this is the forward looking
19 model, a forward looking model where avoided --
20 avoidable costs have been avoided. Knowing that
21 trenching is -- common trenching is quite a common
22 practice, knowing that at least in the case of a
23 Texas electric utility that I studied where there
24 is such conduit sharing, that that was a -- that
25 was a reasonable forward looking assumption, that

1 you would be able to share cost of structure with
2 three other utilities.
3   Q. Was there sharing, in the example you
4 just mentioned, involving a telephone company?
5   A. Yes, there was.
6   Q. Which company?
7   A. Metropolitan Fiber Systems.
8   Q. And is that here in Texas?
9   A. It is.
10   Q. And who was the other utility?
11   A. Electric -- Texas Utilities.
12   Q. Okay. And so does the model assume
13 that all trenching will be shared among at least
14 two other utilities in your model?
15   A. It does exactly that. It doesn't say
16 at least two others. It says it will be shared by
17 two other utilities. Out of all of the possible
18 future companies that may exist that would want to
19 share, it assumes exactly two other companies, so
20 that basically there's a three-way sharing.
21 Counting GTE, there's a three-way share.
22   Q. So that assumption has the effect of
23 reducing by two-thirds the cost that GTE
24 experiences in trenching; correct?
25   A. Yes, that's correct.

1   Q. And that would be a two-thirds
2 reduction over its current or historic levels?
3   A. It's a two-thirds -- I'm not sure what
4 its historic level would be. It's a two-thirds
5 reduction over the cost of trenching that was
6 estimated in our model.
7   Q. Does the Hatfield model assume the
8 aerial price of cable will be equal to the
9 material price of underground cable?
10   A. Yes, it does.
11   Q. Has Hatfield & Associates made any
12 attempt to review the orders and decisions of the
13 state commission, such as the Texas Public
14 Utilities Commission, for specific data to input
15 into the model?
16   A. We generally have relied on the local
17 organization of our client companies, MCI and
18 AT&T, to be aware of and inform us of any such
19 reductions. We, for instance, in Texas for GTE do
20 not use the default values of depreciation lives
21 but use a set of depreciation lives approved by
22 the FCC for GTE, so there is an example. The
23 answer is yes, if there were any other substantial
24 departures, we would not know that independently
25 but would rely on our clients to inform us of

APPENDIX C

1

2   BEFORE THE
              FLORIDA PUBLIC SERVICE COMMISSION
3

4   .
        In Re: Petitions by AT&T   ) DOCKET NO. 960847-TP
5   Communications of the Southern) DOCKET NO. 960980-TP
        States, Inc., MCI   )
6   Telecommunications Corporation)
        and MCI Metro Access   )
7   Transmission Services, Inc., for)
        arbitration of certain terms and)
8   conditions of a proposed   )
        agreement with GTE Florida   )
9   Incorporated concerning   )
        interconnection and resale under)
10   the Telecommunications Act of   )
        1996.   )
11   )

12   THIRD DAY - MORNING SESSION
                       VOLUME 15
13   PAGES 1670 - 1737

14
        PROCEEDINGS: Hearing
15
        BEFORE: CHAIRMAN SUSAN F. CLARK
16   COMMISSIONER DIANA K. KIESLING
                            COMMISSIONER J. TERRY DEASON
17   COMMISSIONER JULIA L. JOHNSON
                            COMMISSIONER JOE GARCIA
18
        PLACE: Betty Easley Conference Center
19   Room 148
                            4075 Esplanade Way
20   Tallahassee, Florida

21   TIME: Commenced at 10:00 a.m.
                            Concluded at 12:00 p.m.
22
        DATE: Wednesday, October 16, 1996
23
        REPORTED BY: SARAH B. GILROY, CP, RPR
24
        APPEARANCES: (As heretofore noted.)